

Title: Mixer tapTechnical Field

- 5 The invention relates to a mixer tap with a vertically movable spout and a separate adjusting means.

Background Art

- 10 US patent No. 4.457.342 discloses a vertically adjustable single-lever valve with a swivel tap. However, this single-lever valve is rather bulky.

Disclosure of Invention

- 15 The object of the invention is to provide a mixer tap with a vertically movable discharge spout of a smaller size and being more discrete than hitherto known.

- According to the invention a mixer tap of the above type is characterised in that the spout can be moved upwards and downwards by means of a piston rod of a hydraulic cylinder. The mixer tap is particularly discrete, if the spout can be led downwards to be flush with the table top.
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The mixer tap may further be adapted such that the water supply to the spout is not opened until the piston rod is in its uppermost position.

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The upward and downward movement of the piston rod may optionally be controlled by the pressure from the water supply.

- Optionally the downward movement of the piston rod may be activated by depressing the end of the spout to release a snap lock.
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According to an optional embodiment the downward movement of the piston rod may be activated by depressing and keeping the adjusting means down until the piston rod and the spout have adopted their lowered positions.

5    Brief Description of the Drawing(s)

The invention is explained in greater detail below with reference to the accompanying drawings, in which

- 10   Fig. 1 illustrates a mixer tap, wherein the upward and downward movement of the spout is controlled by the on/off function of the fitting,

Fig. 2 illustrates a mixer tap, wherein the upward and downward movement of the spout is activated by depressing the end of the spout,

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Fig. 3 illustrates a mixer tap, wherein the upward movement of the spout is activated when the water is turned on, while the downward movement is effected by depressing the end of the spout,

- 20   Fig. 4 illustrates a mixer tap, wherein the upward movement of the spout is activated by depressing the end of the spout, while the downward movement is activated by depressing the adjusting means and keeping it down until the spout has adopted its hidden position,

- 25   Fig. 5 illustrates a mixer tap, wherein the upward movement of the spout is activated when the fitting is turned on, while a downward movement is activated by momentarily depressing the adjusting means,

- 30   Fig. 6 illustrates a mixer tap, wherein the upward and downward movement of the spout is alternately activated by momentarily depressing the adjusting means,

Fig. 7 illustrates an alternative embodiment of the mixer tap according to the invention and

Fig. 8 illustrates the associated hydraulic control circuit.

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#### Best Mode(s) for Carrying out the Invention

The mixer tap shown in fig. 1 includes a vertically adjustable spout 2 and an adjusting means 4 in distance therefrom. The spout 2 is upwardly and downwardly movable by means of a piston rod of a hydraulic cylinder 6 arranged under the table tap. The upward movement of the piston rod is controlled by an oil pressure applied from below, while the downward movement of the piston rod is controlled by an oil pressure applied from above. The two oil pressures originate from oil containers 8, 9 containing displaceable pistons 8a, 9a, water being provided on side of the piston and oil being provided on the other side thereof. A water pressure on side of the piston is thus converted into an oil pressure on the other side of the piston. Via a change-over valve 11 the two oil containers 8, 9 communicate with a cold-water supply and a drain, respectively. The control inlet of the change-over valve 11 communicates with the supply of the mixed water, the temperature thereof being adjusted by means of the adjusting means 4.

The mixer tap operates as follows: The spout 2 is initially in its lowered position by being retained in this position by the pressure from the cold-water supply being fed to the oil container 8 via the change-over valve, said oil container 8 converting the water pressure into an oil pressure depressing the spout 2. At the adjusting means 4 the supply of the mixed water is turned on. The resulting pressure acts on the control inlet of the change-over valve 11. As a result the change-over valve 11 changes its position such that the cold-water pressure instead is applied to the other oil container 9 which then applies an oil pressure raising the spout 2. When the spout 2 is in its uppermost position, an additional change-over valve 13 is activated and turns on the supply of mixed water to the spout 2.

When the water is turned off, the reverse action takes place. The pressure applied by the mixed water to the first change-over valve 11 decreases and the change-over valve 11 changes. As a result the oil pressure applied to the lowermost portion of the cylinder 6 with the piston rod decreases, an oil pressure instead being applied to the uppermost portion of the cylinder 6. As a result, the water supply to the spout 2 is cut off, while the spout is lowered.

In the mixer tap shown in fig. 2 the upward and downward movements of the spout 2 are performed manually, the upward movement of the spout 2 being activated the depressing the end of the spout 2 to release a snap lock 18, whereby a spring or a gas cylinder 7 moves the spout 2 to its uppermost position. When the spout 2 has adopted its uppermost position, an additional change-over valve 13 is activated, said valve turning on the supply of water to the spout 2. The reverse movement of the spout 2 is effected by depressing the end thereof until it is locked by the snap lock 18 in its hidden position.

As the mixer tap shown in fig. 1, the mixer tap shown in fig. 3 includes a cylinder 6 with a piston rod for moving the spout 2. Via an oil container having a displaceable piston for converting water pressure to oil pressure and a change-over valve 11, the lowermost portion of the cylinder 6 communicates with the cold-water supply. The change-over valve 11 is controlled by the pressure of the mixed water.

This mixer tap operates as follows: It is assumed that the spout 2 initially is in its lowered position. When the water supply is turned on at the adjusting means 4, the first change-over valve 11 is activated and thus changes such that an oil pressure is applied to the hydraulic cylinder which in turn moves the spout 2 upwards. When the spout 2 is completely raised, the spout 2 is supplied with mixed water via an additional change-over valve 13. When the supply of mixed water has been turned off at the adjusting means 4, the reverse movement of the spout 2 is effected by pressing the end of the spout 2. Additionally, the supply of mixed water to the spout 2 is cut off due to the disappearing pressure to the lowermost change-over valve 13. When

the spout 2 has returned to its hidden position, the spout 2 is locked by means of a non-shown snap lock.

As the embodiment shown in fig. 1, the embodiment of the mixer tap shown in fig. 4 includes a vertically adjustable spout 2 and an adjusting means 4' spaced apart from the spout. In the embodiment shown in fig. 4 the adjusting means 4' may be depressed, the depression thereof acting on a slide valve controlling the pressure supply to the uppermost portion of the hydraulic cylinder 6. The mixer tap operates as follows. The upward movement of the spout 2 is activated by depressing the end of the spout 2 and releasing a snap lock, subsequent to which a spring or gas cylinder moves the spout 2 into the uppermost position. The reverse movement is obtained by depressing the adjusting means 4' and keeping it down until the spout 2 has adopted its hidden position and is locked by a snap lock. As the embodiment shown in fig. 4 there is provided a slide valve 13 ensuring that water is only supplied to the spout 2 in its uppermost position.

As the embodiment shown in fig. 4, the embodiment of the mixer tap shown in fig. 5 is provided with an adjusting means 4', which can be depressed for activating a slide valve 15. The upward and simultaneous forward movement of the spout 2 is activated by turning on the mixed water at the adjusting means 4'. The pressure from the mixed water thereby activates a slide valve 16 causing the pressure from the cold-water supply to force the piston of the hydraulic cylinder 6 and thus spout 2 upwards via an additional change-over valve 17.

As in the above embodiments the water supply to the spout 2 is not turned on until the spout has adopted its uppermost position. The reverse movement of the spout 2 is activated by momentarily depressing the adjusting means 4', whereby the associated slide valve 15 ensures that the pressure from the cold-water supply decreases momentarily and acts on the subjacent change-over valve 16 which thus is displaced to the left and causes the pressure from the cold-water supply to momentarily move the third slide valve 17 in upward direction such that oil pressure is applied to the

uppermost portion of the cylinder, whereby the piston and thus the associated spout 2 are forced downwards.

As the embodiment shown in figs. 4 and 5, the embodiment of the mixer tap shown  
 5 in fig. 6 is provided with an adjusting means 4' which can be depressed for activating a slide valve 15 communicating therewith. By momentarily depressing the adjusting means 4' the slide valve 15 communicating therewith causes the cold-water pressure to be fed to an active binary flip-flop 19, eg of the type M/1787 from Martonair, applying the pressure alternately to the left or to the right. If the flip-flop ap-  
 10 plies the pressure to the left, a subsequent change-over valve 16' is affected such that the cold-water pressure is fed to a subjacent change-over valve 17 for acting on the lowermost inlet thereof such that oil pressure is applied to the uppermost portion of the hydraulic cylinder 6 which then moves the piston and thus the associated spout 2 downwards. By subsequently momentarily depressing the adjusting means 4', the re-  
 15 verse action takes place.

In all of the shown embodiments the spout is pivotal in its uppermost position.

An alternative embodiment of the mixer tap according to the invention is shown in  
 20 Figs. 7a, 7b and 7c. As the mixer tap shown in Figs. 1-6, the shown mixer tap is provided with a spout 22, which can be moved upwards and downwards. As the one shown in Figs. 1-6, the spout is shaped as a circular arc and moved upwards and downwards by means of a piston 27. However, in the embodiment shown in Fig. 7 a toothed rack 28 is inserted between the piston 27 and the displaceable spout 22, said  
 25 rack 28 driving a toothed belt 30 via a gear wheel 29. The toothed belt 30 is secured to a slide 31 in the end of the spout 22. As a result a piston action will cause the spout 22 to be moved either upwards or downwards.

The structure includes a bracket 32. On one side of the bracket 32 shown in Fig. 7a,  
 30 the movable spout 22 is shown, said spout at the top extending through an opening in a plane flushing with a surface of for instance a kitchen table. In the end the spout

is secured to the slide 31, which may slide along an only partly visible circular track 33 behind the spout 22. A toothed belt 30, which is guided by a number of wheels, is secured to the movable slide 31. A movement of the toothed belt 30 thus causes the slide 31 to be moved either upwards or downwards along the circular track 32. Via a  
 5 shaft extending through the bracket 32 one of the wheels is connected to the gear wheel 29 meshing with the toothed rack 28 on the other side of the bracket 32, confer Fig. 7c. The toothed rack 28 is fixedly connected with the piston rod 27 being upwardly movable dependent on the pressure of a fluid added to the piston.

10 Fig. 8 illustrates the associated hydraulic control circuit. On the left-hand side the supply of cold and mixed water, respectively, is shown. When the mixed water is turned on, a slide valve 35 is effected such that the pressure from the cold water supply is exerted on the cylinder 27 of a piston rod which thereby moves clockwise. When the piston rod reaches an outer position, a pushbutton of a slide valve 36 is ac-  
 15 tivated and is thus displaced in a downward direction. The water pressure being supplied to the right side of a subjacent slide valve 37 thus decreases, whereby the slide valve 37 is displaced to the right such that passage for the mixed water to the discharge spout 22 is ensured.

20 A special release valve 38 is further provided which is to be activated when the spout 22 is to be moved downwards.

Optionally, a cover may be provided over the opening of the discharge spout 22 such that the entire arrangement becomes more discrete, and optionally such that the  
 25 control unit *per se* is not visible.

The mixer tap according to the invention is not intended for kitchen sinks only. It may also be used in connection with a washbasin (basin) or a bathtub or a bidet, optionally also in a shower cabin.

The principle that the actual water pressure is used in connection with a hydraulic control circuit applies in all of the described embodiments.